Final Performance Report: Pollution Prevention Planning and Siloxane D4 (2013-2017)

Pollution Prevention (P2) Planning is a process by which organizations can improve their environmental performance by strategically planning to reduce or eliminate pollution before it is created.

Updated: December 2017

The facilities subject to the P2 Planning Notice in respect of siloxane D4 (D4) in industrial effluents have prepared their P2 plans and submitted their interim progress reports n° 1, 2 and 3 (refer to the Interim Progress Report in Schedule 4 of the Notice) as well as their final declaration indicating that they have completed implementation of their P2 plans (refer to the Declaration That a Pollution Prevention Plan Has Been Implemented in Schedule 5 of the Notice).

This report summarizes the information obtained from 2013 to 2017 in the various documents that facilities were required to submit under the Notice, which are: their initial declaration that a P2 plan has been prepared and is being implemented (refer to the Declaration That a Pollution Prevention Plan Has Been Prepared and Is Being Implemented in Schedule 1 of the Notice), their three interim progress reports, as well as their final declaration. The facilities subject to the Notice have stated that they have adopted several measures to reduce releases of D4 to the environment.

D4 was declared toxic to the environment under the Canadian Environmental Protection Act, 1999. A P2 Planning Notice was selected as the risk management instrument for this substance. The risk management objective in the Notice is to meet, by the end of the implementation period, an 80% reduction in total D4 releases to the aquatic environment from all facilities subject to the Notice compared to the P2 planning preparation year levels.

The reduction target for a facility subject to the Notice is to achieve and maintain either a total D4 concentration in its industrial effluents that is less than or equal to 17.3 µg/L or a total quantity of D4 released in its industrial effluents that is less than or equal to 3 kg/year.

The facilities subject to the Notice were required to submit an initial declaration (Schedule 1 of the Notice) by July 1st, 2013. For the next three years, the facilities had to submit a yearly report on the progress made in implementing their P2 plan (Schedule 4 of the Notice). The facilities had until June 1st, 2016 to achieve the reduction target and had to submit, by July 1st, 2017, a final declaration (Schedule 5 of the Notice) summarizing the outcomes of their implemented P2 plan, including the sampling results obtained during the monitoring year that followed the deadline for achieving the reduction target.

Pollution Prevention Planning Notice Requirements

On June 2, 2012, the Minister of the Environment published a Notice Requiring the Preparation and Implementation of Pollution Prevention Plans in Respect of Cyclotetrasiloxane, octamethyl- (Siloxane D4) in Industrial Effluents.

The Notice applies to any person who owns or operates an industrial facility that, during the 2011 calendar year or any time thereafter, meets the following two criteria:

a) It manufactures or uses D4, or a mixture containing D4, where the total quantity of D4 manufactured or used is equal to or greater than 100 kg per calendar year; and
b) As a result of manufacture or use of D4 or a mixture containing D4, it releases an effluent containing D4 at any final discharge point of the facility.

The Notice also applies to any person who is the successor or assign of the persons referred to in the Notice. Some exceptions (set out in the Notice) apply.

It should be noted that the Notice is still in force; it will continue to apply to any person who finds that they own or operate a subject facility (for instance: a new facility, or an existing facility which D4 use reaches or exceeds the 100 kg threshold).

Facilities subject to the Notice must prepare and implement a P2 plan considering the factors set out in the Notice, namely the reduction target and the sampling and analysis of industrial effluents. As stated above, three interim progress reports are required to be submitted to the Minister during the implementation of the P2 plans. In addition, a final declaration is required to be submitted to the Minister; this declaration sets out the results from "the monitoring year", i.e. the one-year period after the reduction target is achieved during which sampling at final discharge points, and analysis of samples, must be carried out. The interim progress reports and the final declaration help assess the performance of the Notice in meeting the reduction target.

Actions implemented by facilities to meet the reduction target

In 2013, seven facilities submitted a Declaration that a Pollution Prevention Plan Has Been Prepared and Is Being Implemented. Since then, one of these facilities has shut down its operations.

Table 1 presents information provided in interim progress reports and final declarations regarding actions planned or that have taken place as part of the P2 plans.

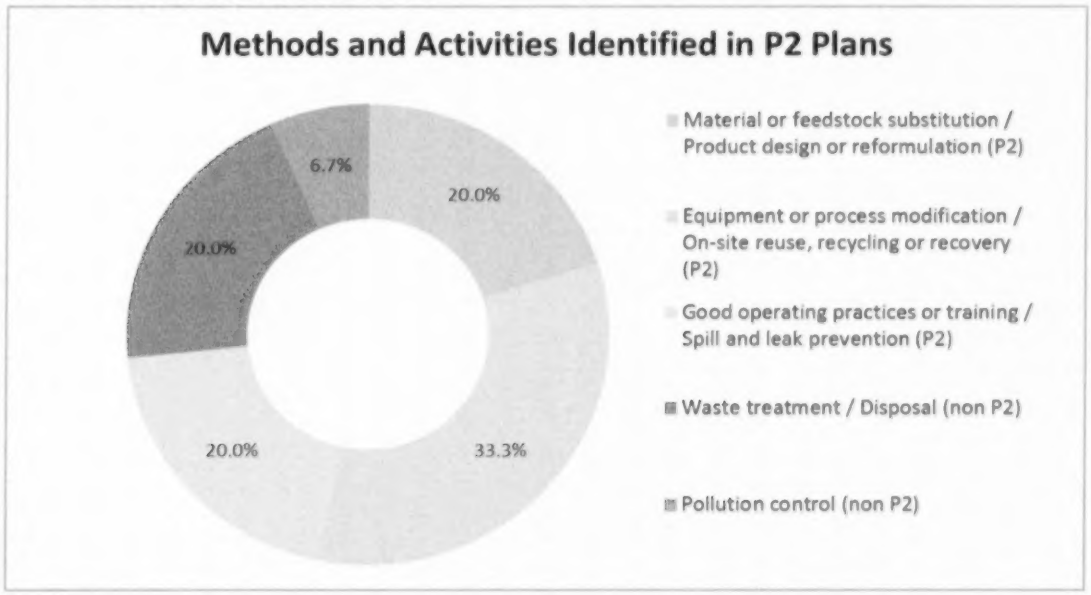
Table 1: Methods and Actions Identified by Facilities to Reduce Releases of D4 in Their Effluents

Methods	Planned Actions
Materials or feedstock substitution / Product design or reformulation	Gradual elimination of D4 in manufactured goods. Identification of alternatives to D4 in order to stop using it. Use of a mixture with a lower D4 concentration when manufacturing products.
Equipment or process modification / On-site reuse, recycling or recovery	Improvement of reactor cleaning methods in order to decrease water use and effluent volume. Recycling of silicone (containing D4) collected through the rinsing of tanks.
Good operating practices or training / Spill and leak prevention	Implementation of better practices for operation and maintenance of systems. Employees given training in how to limit D4 releases into wastewater.
Pollution control	Use of an activated carbon filter. Use of a combined flocculation/activated carbon treatment system.
Waste treatment / Disposal	Prevention of silicone releases (containing D4) into drains by pumping it into barrels, the contents of which will be destroyed using an appropriate method. Disposal of D4-containing raw materials in stock.

Pollution prevention is about anticipating and preventing pollution instead of reacting to it after the fact. Pollution prevention does not stand alone; it is part of an ongoing pollution management approach that comprises prevention, control and clean-up. Pollution prevention focuses on not creating pollutants rather than on trying to manage them after they have been created. The federal government believes that pollution prevention is the most effective means of protecting our environment, avoiding costly waste and promoting sustainable development. Pollution prevention actions were selected by 73% of subject facilities (it should

be noted that the facilities have planned to implement and have implemented a number of measures).

Figure 1: Distribution of Methods and Activities Identified by the Facilities Subject to the Notice to Reduce Releases of D4


Methods and Activities Identified in P2 Plans
6.7%
20.0%
20.0%
20.0%
33.3%
Material or feedstock substitution / Product design or reformulation (P2)
Equipment or process modification / On-site reuse, recycling or recovery (P2)
Good operating practices or training / Spill and leak prevention (P2)
Waste treatment / Disposal (non P2)
Pollution control (non P2)

Summary of Results

By July 1st, 2017, five of the facilities had declared that they had met the reduction target as a result of implementing their P2 plan, and had completed one year of monitoring. The sixth facility had indicated that it had fully implemented its P2 plan, but that despite significant reductions in its D4 releases, had not managed to meet the risk management objective of the Notice. This facility is the biggest D4 user subject to the Notice and, possibly because of this, has not met the reduction target set out in the Notice. Table 2 presents the total D4 releases of all facilities during the preparation year and after implementation of the P2 plans, as well as the resulting reduction rate of those releases.

Table 2: D4 Releases — Before and After the Implementation of P2 Plans

Total of D4 releases declared in 2013 (kg)	Total of D4 releases declared in 2017 (kg)	Reduction 2013-2017 (%)
227	101	56

With a 56% reduction of D4 releases, the Notice has only allowed to reach two thirds of its risk management objective (80% reduction in total D4 releases), from the preparation year until completion of the implementation of P2 plans. However, with the exception of the facility that has not met the risk management objective of the Notice, all facilities have met the reduction target set out in the Notice. In other words, five facilities out of six either have reduced the D4 concentration in their effluents to a level that is less than or equal to 17.3 µg/L or have released a total quantity of D4 in their effluents that is less than or equal to 3 kg per year.

Environment and Climate Change Canada and the facility that did not meet the risk management objective of the Notice continue to work together to examine measures that can be undertaken to further reduce the D4 releases of the facility.

Background

What is D4?
D4 is an industrial chemical that is currently imported into Canada. It is mainly used in the manufacture of silicone polymers and copolymers. D4 is also used in personal care products and can be found in a variety of other products including defoamers, lubricants, cleaning products, adhesives, sealants and coatings.

D4: Why is pollution prevention important?
D4 was declared toxic under the Canadian Environmental Protection Act, 1999. The final Screening Assessment Report concluded that D4 meets the criteria for persistence as set out in the Persistence and Bioaccumulation Regulations. D4 was assessed for all environmental media including air, water and soil, and it was determined that the presence of this substance in the aquatic environment is a source of concern.

Sources

- Pollution prevention information
  https://www.canada.ca/en/environment-climate-change/services/pollution-prevention.html
- Text of the P2 Planning Notice in respect of Siloxane D4
  http://www.gazette.gc.ca/rp-pr/p1/2012/2012-06-02/html/sup2-eng.html
- Information on declarations submitted by facilities
  https://www.canada.ca/en/environment-climate-change/services/pollution-prevention/planning-notices/search.html
- Screening Assessment Report for Siloxane D4
  http://www.ec.gc.ca/ese-ees/default.asp?lang=En&n=4996570F-1

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